To: Mayor Darin Taylor, City of Middleton

From: Bryan Foote, P.E.

Date: June 3, 2015

HORROCKS ENGINEERS

MEMORANDUM

Subject: Task Order 15-1; Skyline Drive at Intersection with SH-44

The City of Middleton contracted with Horrocks Engineers to evaluate the need to modify or close Skyline Dr north of the intersection at SH-44. This memorandum addresses the concerns of the intersection and possible actions to take in order to improve the safety of the intersection especially as traffic volumes increase within the City. This intersection is shown in a Google Earth image below (Photo 1):

Photo 1: Aerial view of Intersection

The intersection is located on the east end of town along SH-44/E Main Street. The following are a few pictures of the intersection in its current configuration:

Photo 2: Southbound on Skyline Drive approaching SH-44

Photo 3: Northbound at Ridley's Entrance/Exit approaching SH-44 (view of Skyline Dr across SH-44)

Photo 4: Eastbound on SH-44 approaching Skyline Dr

Photo 5: Westbound on SH-44 approaching Skyline Dr

The important evaluation criteria included:

- Safety (including crash data and geometry)
- Traffic (including volumes and rerouting traffic to the intersection at N. Middleton Rd and SH-44)
- Roadway maintenance
- Access control

Safety Evaluation

Accident History
The evaluation of this intersection included crash history.

We requested crash data from the City's Police Department for the years of 2012 and 2015. According to their records for the past three and a half years there have only been five accidents reported. It is important to note that the two crashes in 2014 were a result of the access at the Ridley's and not because of Skyline Dr. According to the MUTCD this is considered a low number of crashes for an intersection and would not warrant full control with the use of a signal. We understand that the Skyline Dr access to SH-44 is of concern to the City and its residents and the City would like to close Skyline Drive completely to SH-44.

Intersection Geometry
At this intersection the major movement (SH-44) is uncontrolled with the minor movement (Skyline Dr/Ridley's access) controlled by stop signs. Skyline Drive is signed at 15 mph. The major movements along SH-44 (east and westbound) are approximately perpendicular to Skyline Dr. This is the best case scenario for intersection geometry.

The intersection of Skyline Dr and SH-44 is located approximately 325 feet to the east of one of the City's major intersections, S Middleton Rd and SH-44. This close proximity is cause for concern at that signalized intersection and its geometrics. These concerns are detailed further later in this memorandum.

An evaluation of the intersections sight triangles for all movements at the intersection indicates proper stopping sight distance. There are currently no sight obstructions to impair the driver from making proper decisions when navigating this intersection.

Other factors can affect the safety of an intersection. These include but are limited to day and night time visibility especially during peak hour traffic and intersection lighting. These items were not evaluated as part of this study, however, one of the accidents in 2014 listed the bright sun as a vision distraction and contributing circumstance to the collision.

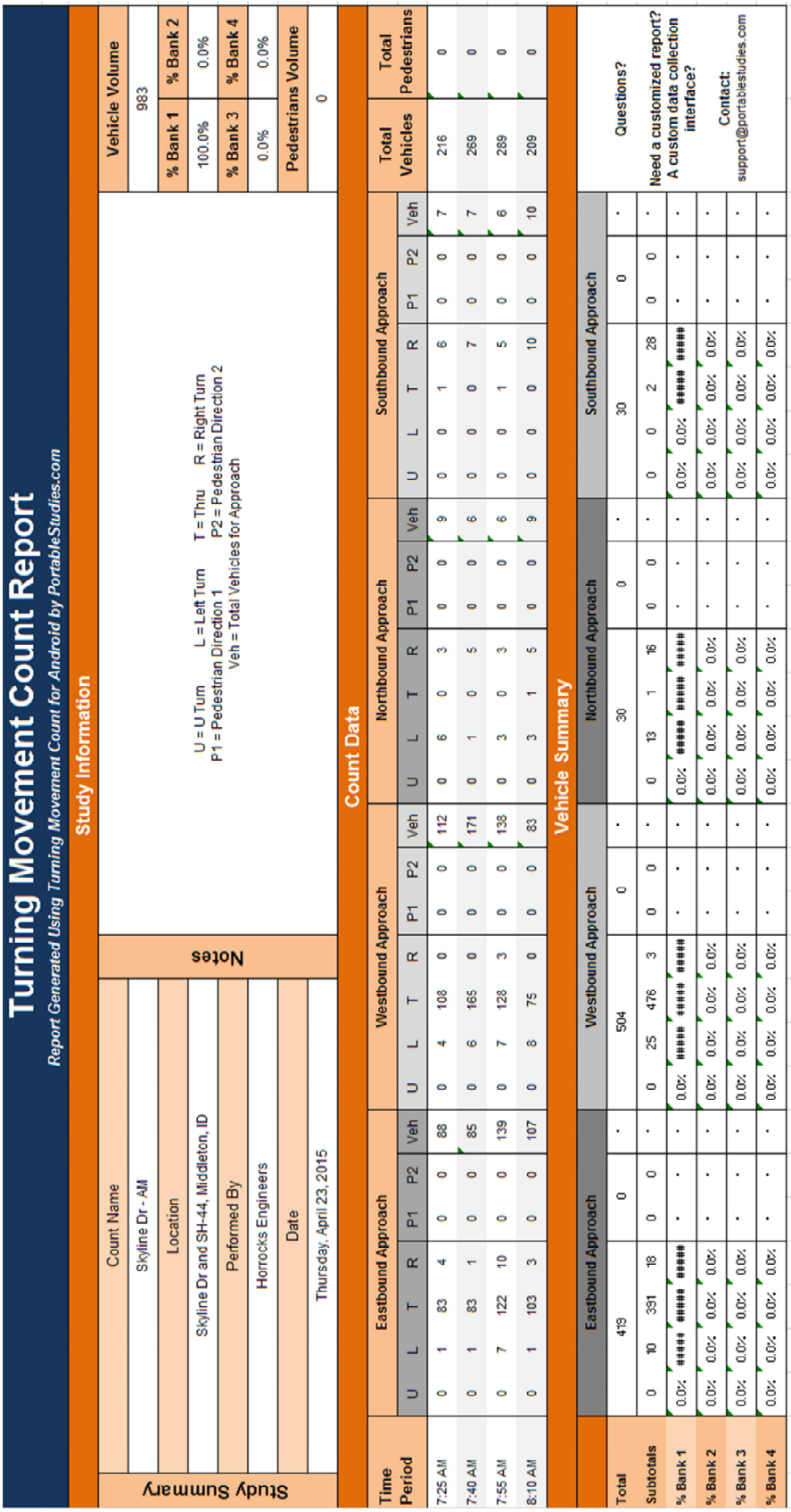
This intersection does meet allowable geometric standards. However, engineering judgement indicates that with the close proximity to the City's only signalized intersection just 325 feet to the west, there are less than desirable conditions for network users accessing Skyline Dr. These conditions will be further compounded as the City population grows and traffic increases on SH-44.

Traffic

Traffic Volumes
Turning movement traffic counts were counted on Thursday, April 23, 2015 during the AM and PM peak hours. During the traffic counts the following observations were made:

- Daytime visibility is good and not impaired by the sun in the AM and PM peak hours
- Residents using intersection are very familiar with operations
- Left turning storage lengths turning from SH-44 to Skyline Dr are inadequate and conflict with westbound turn lanes and storage lengths for the signal at S Middleton Rd and SH-44.
- All operations are appropriate for the intersection except for the eastbound left turn from SH-44 onto Skyline Dr. There is little to no storage length for vehicles to safely wait for a gap in the conflicting through movement traffic
- Majority of traffic uses SH-44 and the Ridley's access. There appears to be a small amount of traffic that currently uses Skyline Dr as observed by traffic counts
- Conflict within the center turn lane traffic was apparent at the intersection in the AM and PM peak; however, no accidents occurred

The PM traffic count was higher than the AM count which was expected. The PM peak hour was between 4:45 PM and 5:45 PM. The figures below (Figure 1 and Figure 2) show the AM and PM peak hour traffic count results of the intersection:



Turning Movement Count Report

Report Generated Using Turning Movement Count for Android by PortableStudies.com

Study Information

Study Summary

Count Name	Skyline Dr - AM
Location	Skyline Dr and SH-44, Middleton, ID
Performed By	Horrocks Engineers
Date	Thursday, April 23, 2015

Notes

U = U Turn L = Left Turn T = Thru R = Right Turn
P1 = Pedestrian Direction 1 P2 = Pedestrian Direction 2
Veh = Total Vehicles for Approach

Vehicle Volume

983

% Bank 1	% Bank 2
100.0%	0.0%
% Bank 3	% Bank 4
0.0%	0.0%

Pedestrians Volume

0

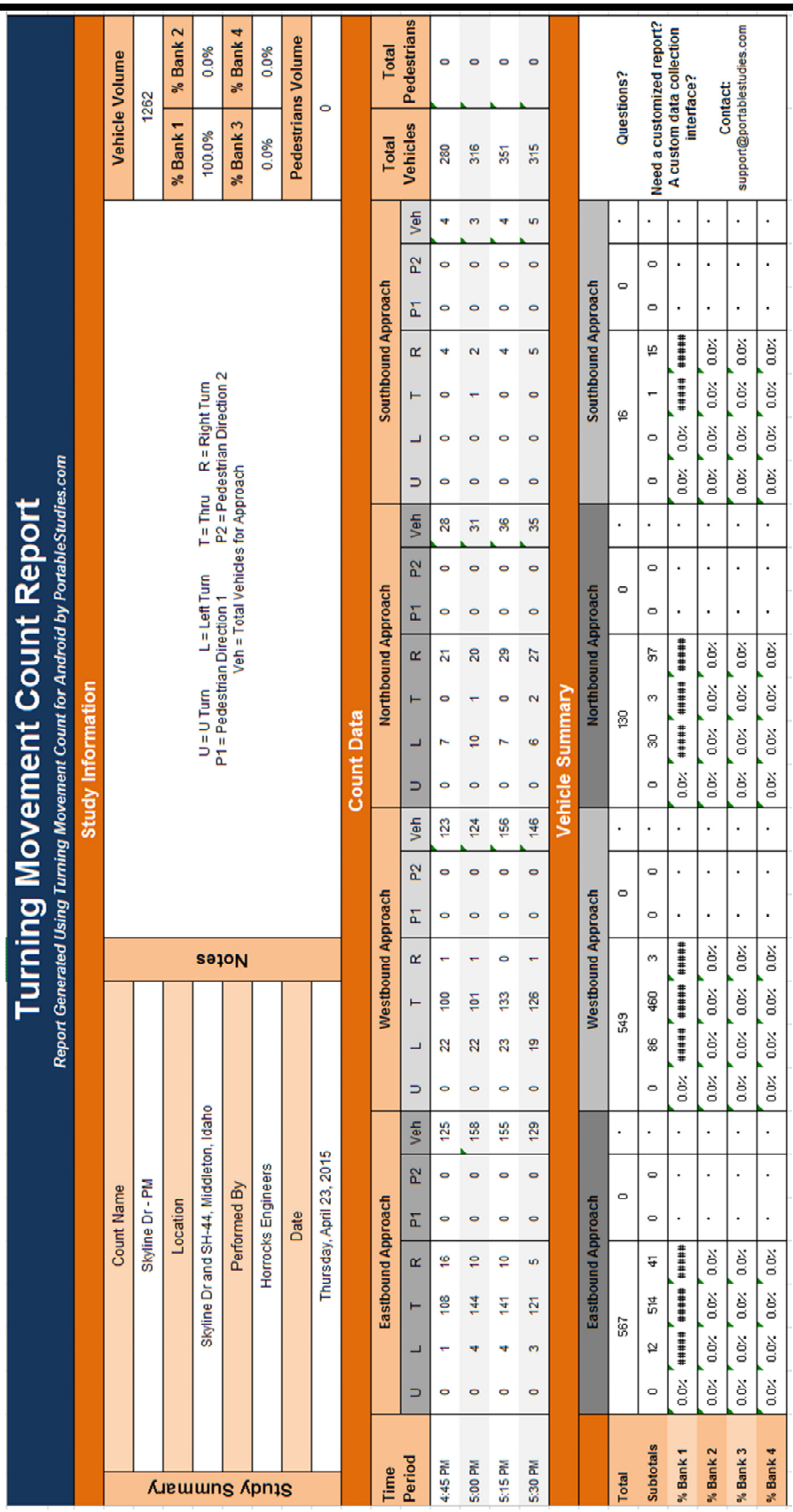
Count Data

Time Period	Eastbound Approach							Westbound Approach							Northbound Approach							Southbound Approach							Total Vehicles	Total Pedestrians
	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh		
7:25 AM	0	1	83	4	0	0	88	0	4	108	0	0	0	112	0	6	0	3	0	0	9	0	0	1	6	0	0	7	216	0
7:40 AM	0	1	83	1	0	0	85	0	6	165	0	0	0	171	0	1	0	5	0	0	6	0	0	0	7	0	0	7	269	0
7:55 AM	0	7	122	10	0	0	139	0	7	128	3	0	0	138	0	3	0	3	0	0	6	0	0	1	5	0	0	6	289	0
8:10 AM	0	1	103	3	0	0	107	0	8	75	0	0	0	83	0	3	1	5	0	0	9	0	0	0	10	0	0	10	209	0

Vehicle Summary

	Eastbound Approach							Westbound Approach							Northbound Approach							Southbound Approach							Questions?
Total	419				0		·	504				0		·	30				0		·	30				0		·	·
Subtotals	0	10	391	18	0	0	·	0	25	476	3	0	0	·	0	13	1	16	0	0	·	0	0	2	28	0	0	·	Need a customized report? A custom data collection interface?
% Bank 1	0.0%	#####	#####	#####	·	·	·	0.0%	#####	#####	#####	·	·	·	0.0%	#####	#####	#####	·	·	·	0.0%	0.0%	#####	#####	·	·	·	
% Bank 2	0.0%	0.0%	0.0%	0.0%	·	·	·	0.0%	0.0%	0.0%	0.0%	·	·	·	0.0%	0.0%	0.0%	0.0%	·	·	·	0.0%	0.0%	0.0%	0.0%	·	·	·	
% Bank 3	0.0%	0.0%	0.0%	0.0%	·	·	·	0.0%	0.0%	0.0%	0.0%	·	·	·	0.0%	0.0%	0.0%	0.0%	·	·	·	0.0%	0.0%	0.0%	0.0%	·	·	·	Contact: support@portablestudies.com
% Bank 4	0.0%	0.0%	0.0%	0.0%	·	·	·	0.0%	0.0%	0.0%	0.0%	·	·	·	0.0%	0.0%	0.0%	0.0%	·	·	·	0.0%	0.0%	0.0%	0.0%	·	·	·	

Figure 1: AM Peak Hour Count Results



Turning Movement Count Report

Report Generated Using Turning Movement Count for Android by PortableStudies.com

Study Information

Study Summary

Count Name	Skyline Dr - PM
Location	Skyline Dr and SH-44, Middleton, Idaho
Performed By	Horrocks Engineers
Date	Thursday, April 23, 2015

Notes

U = U Turn L = Left Turn T = Thru R = Right Turn
P1 = Pedestrian Direction 1 P2 = Pedestrian Direction 2
Veh = Total Vehicles for Approach

Vehicle Volume	
1262	
% Bank 1	% Bank 2
100.0%	0.0%
% Bank 3	% Bank 4
0.0%	0.0%
Pedestrians Volume	
0	

Count Data

Time Period	Eastbound Approach							Westbound Approach							Northbound Approach							Southbound Approach							Total Vehicles	Total Pedestrians
	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh	U	L	T	R	P1	P2	Veh		
4:45 PM	0	1	108	16	0	0	125	0	22	100	1	0	0	123	0	7	0	21	0	0	28	0	0	0	4	0	0	4	280	0
5:00 PM	0	4	144	10	0	0	158	0	22	101	1	0	0	124	0	10	1	20	0	0	31	0	0	1	2	0	0	3	316	0
5:15 PM	0	4	141	10	0	0	155	0	23	133	0	0	0	156	0	7	0	29	0	0	36	0	0	0	4	0	0	4	351	0
5:30 PM	0	3	121	5	0	0	129	0	19	126	1	0	0	146	0	6	2	27	0	0	35	0	0	0	5	0	0	5	315	0

Vehicle Summary

	Eastbound Approach							Westbound Approach							Northbound Approach							Southbound Approach							Questions?
Total	567				0		·	549				0		·	130				0		·	16				0		·	
Subtotals	0	12	514	41	0	0	·	0	86	460	3	0	0	·	0	30	3	97	0	0	·	0	0	1	15	0	0	·	Need a customized report? A custom data collection interface?
% Bank 1	0.0%	#####	#####	#####	·	·	·	0.0%	#####	#####	#####	·	·	·	0.0%	#####	#####	#####	·	·	·	0.0%	0.0%	#####	#####	·	·	·	
% Bank 2	0.0%	0.0%	0.0%	0.0%	·	·	·	0.0%	0.0%	0.0%	0.0%	·	·	·	0.0%	0.0%	0.0%	0.0%	·	·	·	0.0%	0.0%	0.0%	0.0%	·	·	·	
% Bank 3	0.0%	0.0%	0.0%	0.0%	·	·	·	0.0%	0.0%	0.0%	0.0%	·	·	·	0.0%	0.0%	0.0%	0.0%	·	·	·	0.0%	0.0%	0.0%	0.0%	·	·	·	Contact: support@portablestudies.com
% Bank 4	0.0%	0.0%	0.0%	0.0%	·	·	·	0.0%	0.0%	0.0%	0.0%	·	·	·	0.0%	0.0%	0.0%	0.0%	·	·	·	0.0%	0.0%	0.0%	0.0%	·	·	·	

Figure 2: PM Peak Hour Count Results

A figure showing the existing PM peak hour turning movements has been included at the end of this memorandum as a reference and visual of what is currently happening at the intersection. As expected, the higher volume of traffic is on SH-44 (Westbound and Eastbound). Another observation as a result of the intersection counts is that the southbound right turn is the major movement on Skyline Dr. The right turns have the least amount of traffic conflict from other movements at the intersection. Due to the high percentage of southbound right turning traffic, it suggests that network users are largely using this intersection for the purpose of accessing SH-44 to go towards the City's center. The counts also show that even during the peak hours that the amount of vehicles using Skyline Dr is very low and are a very small percentage of vehicles using this intersection. The amount of accidents that occur at this intersection also suggest that this is a relatively safe intersection.

One possible alternative to fixing this intersection could be a southbound right out only on Skyline Dr. This could be done by constructing curbing and channelization to accommodate the southbound right turn and restrict all other movements from and to Skyline Dr.

Lane Use Conflict
As mentioned above the intersection of Skyline Dr and SH-44 is located approximately 325 feet to the east of one of the City's major intersections and only signal at S Middleton Rd and SH-44. According to the ITD Traffic Manual there needs to be proper spacing between the minor streets accessing a major street and signals on the major street. Figure 3 is from the ITD Traffic Manual depicting this scenario.

Figure 202.05-02 Painted Pavement Markings At Signalized Intersections

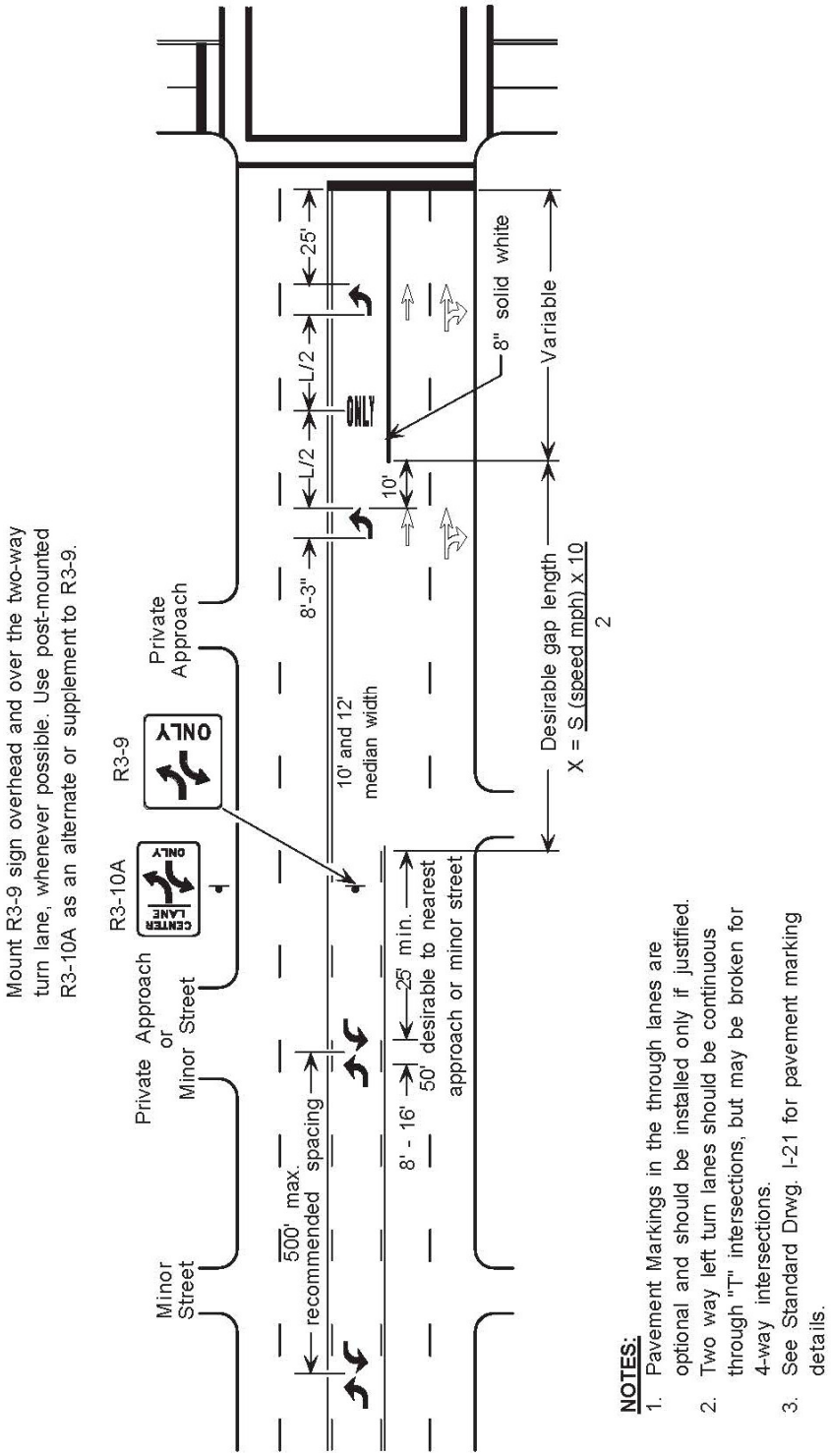


Figure 3: Required Distances between Minor Streets and Signalized Intersections

As shown in the figure above, there needs to be a minimum of 25 feet between the end of the "Gap Length" and the "Minor Street". Currently there is not distance between these two. Photo 6 shows the current layout for this intersection.

Photo 6: Current Intersection Distances from Signal

The lack of distance between Skyline Dr (minor street) and the signal creates a traffic flow problem and will create further congestion as the traffic volumes within the City increase. Currently the problem is not apparent because the traffic volumes on Skyline Dr are so low.

Another problem that may create congestion along SH-44 at this intersection is the ability to use the center turn lane for eastbound traffic trying to turn left onto Skyline Dr. Eastbound traffic trying to turn left onto Skyline Dr would have to use the signal's westbound left turn lane as a refuge area. If queuing backs up for the signal in the westbound left turn lane far enough to block the eastbound left turn onto Skyline Dr, eastbound vehicles trying to turn left onto Skyline Dr will stop and wait for a gap blocking the eastbound SH-44 through traffic and may cause congestion. This obviously creates an unsafe situation for both eastbound and westbound traffic on SH-44. There is a small percentage of drivers currently trying to make the eastbound left maneuver at Skyline Drive, but this will change as traffic volumes increase on SH-44. As traffic on SH-44 increases the available gaps to make the eastbound left onto Skyline Dr will decrease causing congestion that could potentially affect the busy signal to the west.

Alternatives to fix the problem were evaluated included the use of curbing and/or reflective candlesticks along SH-44 to channelized traffic and/or the use of "right in, right out" pork chops on Skyline Dr and the Ridley's access. The use of pork chops to restrict traffic to a "right in, right out" really do not work and drivers will still try to maneuver around the pork chops. If curbing and/or reflective candlesticks are used along SH-44, the curbing would restrict storage for the westbound left turn lane for the signal and potentially back traffic up along SH-44 and increase the queuing. None of these alternatives produced a good and safe solution especially for the low volumes of traffic accessing Skyline Dr.

One alternative to fixing Skyline Dr is a southbound right out only configuration. This right out only from Skyline Dr would accommodate the major traffic movement and would involve the construction of curbing and channelization in order to restrict all other movements from and onto Skyline Dr. The right out only would need to be engineered in order to property deflect the southbound right turns and restrict all other movements.

This study did not include the cost associated with designing and constructing the right out only solution. Obviously closing Skyline Dr completely would have less construction cost associated with it than the right out only alternative would. An important concern of the right out only alternative is that vehicles turning right onto SH-44 from Skyline Dr who are trying to turn left onto S Middleton Rd do not have enough weaving distance to properly and safely turn right and then change lanes into the left turn lane at the signal. As traffic increases along SH-44 this will become even more challenging and could potentially cause unnecessary congestion at the signal. If the City decides to purse the right out only configuration, a traffic count is recommended at the intersection again to see what volume of traffic is turning right off of Skyline Dr and then weaving into the left turn lane at the signal.

Rerouting Traffic
If Skyline Drive were to be closed, traffic using this street would potentially be rerouted to the intersection of N Middleton Rd and SH-44. An evaluation of that intersection and its capacity is not needed because of the minor amount of traffic that would be rerouted to that location. The evaluation of rerouting the traffic to that intersection and the affects it might have was not part of this study.

If the right out only alternative is chosen and constructed, the southbound major movement (right turn) would not have to be rerouted to the N Middleton Rd and SH-44 intersection.

Traffic Flow
Traffic flow throughout the City is an important component to the users of the street network. Alternate routes are of benefit to the City and the network users until they become a hazard. We believe that this intersection does pose a hazard at the current time even though the volumes are low and as traffic volumes increase on SH-44 this will further be evident.

Roadway Maintenance

The City's street network is large and very costly. Closure of Skyline Drive would allow the City's resources to be used in other more necessary parts of the City. It is recommended that if Skyline Drive is closed that the road between SH-44 and Harmon Way be obliterated and barricades be installed thus impeding drivers to access SH-44 from Harmon Way.

If a right out only alternative is chosen for Skyline Dr, proper engineering design should be produced so that construction of the curbing and channelization would restrict all other movements.

Access Control

Controlling access along SH-44 is an important safety consideration for the City. Closing Skyline Drive would eliminate an access point onto SH-44 close to the signal at S Middleton Rd and SH-44. Even though the traffic volumes using Skyline Dr are low, closing Skyline Dr will provide the network users with safer user conditions. If the City decides to close Skyline Dr, the access to SH-44 should not be abandoned through ITD. The City should maintain the permit and access agreement.

Another alternative to the closure of Skyline Dr is the construction of a southbound right turn only, thus maintaining a more direct point of access to the City's downtown district for the residents north of Skyline Dr.

Conclusions/Recommendations

The intersection of Skyline Dr and SH-44 was evaluated based on of number of operational criteria. The major concern of this study is the close proximity that this intersection is to the City's only signalized intersection just a few hundred feet to the west of Skyline Dr. The intersection does meet all geometric standards, however proximity to the signal creates safety and operations concerns. It is recommended that the City close Skyline Dr and reroute traffic to the intersection of N Middleton Rd and SH-44. If the City decides to close Skyline Dr the following recommendations should be done:

- Hold a public meeting to inform residences and businesses within the area of the decision
- Give proper notification prior to closing Skyline Dr
- Obliterate Skyline Dr between SH-44 and Harmon Way
- Install barricades somewhere between SH-44 and Harmon Way to impede drivers
- Consider maintaining a pedestrian access between Harmon Way and SH-44
- Coordinate with ITD regarding this closure; however, do not abandon the access agreement with the State
- Connect the solid white shoulder line on the north side of SH-44 across Skyline Dr to delineate drivers.

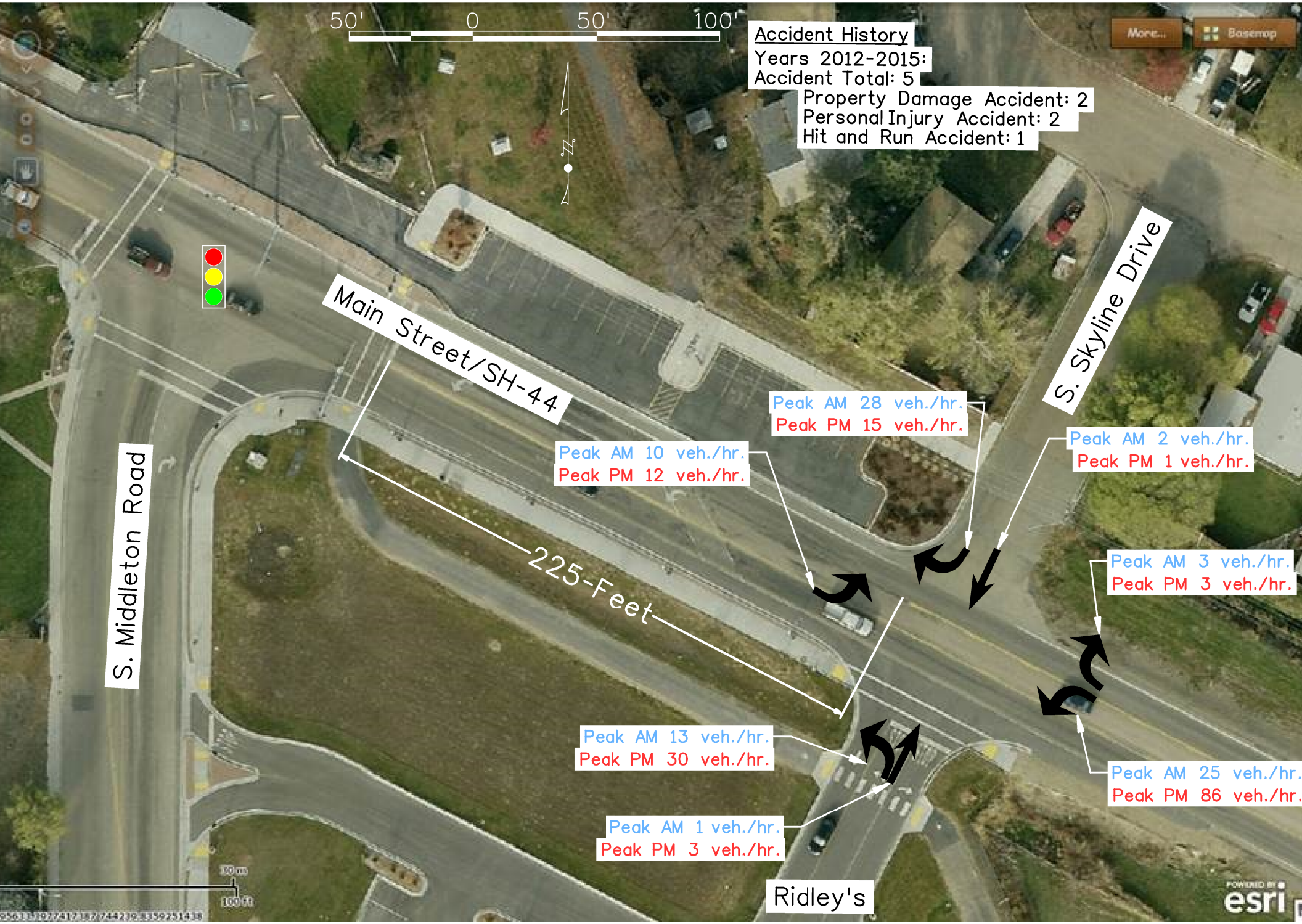
- Coordinate with emergency services prior to closure to ensure that all concerns are addressed

An alternative to closing Skyline Dr is to design and construct a southbound right turn only on Skyline Dr. Curbing and channelization would restrict all other movements to and from Skyline Dr. If the City decides to pursue this alternative the following recommendations should be done:

- Hold a public meeting to inform residences and businesses within the area of the decision and the layout
- Give proper notification prior to construction
- Perform an AM traffic count to see the amount of traffic that turns right from Skyline Dr onto SH-44 then changes lanes into the left turn lane at the signal
- Engineer and design the right turn only from Skyline Dr so that all other movements are restricted
- Coordinate with emergency services during design to ensure that emergency vehicles can properly use the right turn on Skyline Dr as well as ensure that all concerns are addressed

The City will be responsible for the final decision whether to close Skyline Drive or leave it as is. This memorandum addressed the concerns of the intersection and recommended an action to take in order to improve the safety of the intersection especially as traffic volumes increase within the City.

cc: Amy Woodruff – City Engineer
File


50' 0 50' 100'
Accident History
Years 2012-2015:
Accident Total: 5
Property Damage Accident: 2
Personal Injury Accident: 2
Hit and Run Accident: 1
Main Street/SH-44
S. Middleton Road
S. Skyline Drive
225-Feet
Peak AM 28 veh./hr.
Peak PM 15 veh./hr.
Peak AM 10 veh./hr.
Peak PM 12 veh./hr.
Peak AM 2 veh./hr.
Peak PM 1 veh./hr.
Peak AM 3 veh./hr.
Peak PM 3 veh./hr.
Peak AM 13 veh./hr.
Peak PM 30 veh./hr.
Peak AM 25 veh./hr.
Peak PM 86 veh./hr.
Peak AM 1 veh./hr.
Peak PM 3 veh./hr.
Ridley's
esri